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Evaluation of Using Data as a Strategic Asset in the Department of National Defence/Canadian Armed Forces

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ACRONYMS

ADM(CIO)	Assistant Deputy Minister (Chief Information Officer)
ADM(DIA)	Assistant Deputy Minister (Data, Innovation, Analytics)
ADM(Mat)	Assistant Deputy Minister (Materiel)
ADM(RS)	Assistant Deputy Minister (Review Services)
CA	Canadian Army
CAF	Canadian Armed Forces
CCSI	Chief of Combat Systems Integration
CDS	Chief of the Defence Staff
CJOC	Canadian Joint Operations Command
DCP	Digital Campaign Plan
DCP-OP	Digital Campaign Plan Outcome-based Plan
DM	Deputy Minister
DND	Department of National Defence
DTO	Digital Transformation Office
FY	Fiscal Year
IM	Information Management
IT	Information Technology
L0/L1/L2/L3	Level 0/Level 1/Level 2/Level 3
OCI	Office of Collateral Interest
OPI	Office of Primary Interest
PMEC	Performance Measurement and Evaluation Committee
RCN	Royal Canadian Navy
SoR	Systems of Record
TB	Treasury Board
VCDS	Vice Chief of the Defence Staff

EXECUTIVE SUMMARY

This report presents the results of the Evaluation of Using Data as a Strategic Asset in the Department of National Defence (DND) and the Canadian Armed Forces (CAF), conducted during Fiscal Year (FY) 2022/23 by Assistant Deputy Minster (Review Services) (ADM[RS]) in compliance with the Treasury Board of Canada (TB) Policy on Results. The evaluation assessed the extent to which DND/CAF has made progress in leveraging its data to improve its operational capability, service delivery, analysis and decision making.

Description

The activities discussed in this evaluation are not defined as a program in DND/CAF. They are a series of activities undertaken across the organization with a view to applying digitalization and automated approaches to use data to support a wide range of decision making. This decision making is at all levels: strategic, tactical and operational.

Scope

The focus of the evaluation was on DND/CAF's use of data to support decision making. Therefore, the functions of Information Management (IM) and Information Technology (IT) were discussed as a related component during the evaluation research. However, the two discrete DND/CAF functions of IM and IT were not included formally in the scope of this study.

Results

The evaluation determined that important new foundational elements were established across DND/CAF. Since 2017, key components have been put in place, including the establishment of new organizations, policies, practices, capabilities and systems. When new analytics tools became available across DND/CAF, organizations began to build systems to organize and visualize data to support decisions, to automate processes and to use for other purposes. However, the result of these efforts has been the development of a patchwork of decision support systems in a wide range of areas. These systems were developed without a clear reference to what DND/CAF's priorities were. Furthermore, the CAF had not identified what it needed most so that the new system development could respond to those needs.

The evaluation found that the necessary enterprise-level governance was not fully defined. A recent reorganization will produce a realignment of responsibilities and accountabilities. It is not yet clear which organization(s) will be responsible for communicating priorities, monitoring progress against those priorities and reporting on progress.

Most of the new systems were relying on data in systems of record (SoR). However, data in other systems and newly digitized data were not formally managed. Overall, data is not yet codified, managed, accessible and updated as frequently as needed in DND/CAF.

Finally, DND/CAF's policy suite is not integrated and framed in a holistic manner to support the enterprise. The policy suite does not reflect the broad principles of TB's Policy on Service and Digital, which emphasizes an integrated approach to governance, planning and management.

Overall Conclusions

DND/CAF is not optimizing the investments in decision support systems currently being made across the organization. Setting out enterprise-wide priorities to guide these activities and implementing a structure to monitor and report on progress will help the organization's progress in leveraging data to support decision making at the strategic, operational and tactical levels.

Recommendations

1. Establish DND/CAF-wide priorities for developing decision support systems, ensuring a defined balance between strategic, operational and tactical priorities.
2. Establish CAF-specific priorities for developing decision support systems to inform L1 and DND/CAF enterprise priorities.
3. Establish a governance regime that will communicate DND/CAF priorities, monitor progress against those priorities and report on progress.
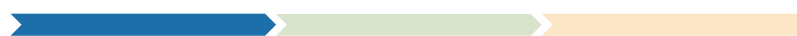
EVALUATION ISSUES AND SCOPE

The Evaluation of Using Data as a Strategic Asset in DND/CAF was conducted in accordance with the TB Policy on Results and the DND/CAF Five-Year Departmental Evaluation Plan (FY 2021/22).

The aim of the evaluation was to assess the extent to which DND/CAF has made progress in leveraging its data to improve its operational capability, service delivery, analysis and decision making. The project was originally defined as a Formative Evaluation of Data Analytics; however, the scope was expanded to include DND/CAF's broader efforts to leverage data to support decision making at the strategic, operational and tactical levels, including those not specifically associated with the Data Analytics Initiative.

The project included six evaluation questions related to performance.

Scope

Each one of the activity areas described within this evaluation, such as strategies, projects, or investments, could have been the subject of its own in-depth evaluation. However, this was not the objective of this study, and the findings and conclusions are based on a global overview analysis of all these activities combined.

The evaluation included activities undertaken by DND/CAF from July 2017 to the end of 2022. This period begins with the issuance of the Chief of the Defence Staff (CDS)/Deputy Minister (DM) Joint Directive to Develop and Operationalize a Defence Program Analytics Capability.

The evaluation used multiple lines of evidence collected through qualitative research methods (see Annex C for methodology and limitations).

Evaluation Questions

1. What has DND/CAF achieved to date in terms of leveraging data to support:
   a) Strategic, tactical and operational decision making for enterprise-level priorities?
   b) Individual L1 priorities?
2. Is the necessary enterprise-level governance in place, including responsibilities and accountability structures?
3. Is there integrated management of information and data to support enterprise-level decision making?
4. Is information and data life cycle management in place?
5. To what extent is DND/CAF aligned with policies set out by TB?
6. What opportunities for improvement exist in relation to DND/CAF's capability to manage information and data as a strategic asset?

Photo credit: Captain Evelyne Lemire HS88-2017-0013-015

DESCRIPTION OF THE ACTIVITIES UNDER EVALUATION

The activities discussed in this evaluation are not defined as a program in DND/CAF's Program Inventory. They are a series of activities undertaken across the organization with a view to applying digitalization and automated approaches to use data to support a wide range of decision making. This decision making is at all levels: strategic, tactical and operational. Annex D provides an overview of the systems that were described as part of this evaluation.

DND/CAF has been implementing decision support technologies for decades. However, in July 2017, through the Joint Directive to Develop and Operationalize a Defence Program Analytics Capability, DND/CAF set in place an initiative intended to drive digital transformation and accelerate the ability to support decision making by leveraging data and information. That initiative led to a series of actions across L1s, many of which complemented and/or enhanced decision support work already underway. Many of these actions and others are described in this report as part of the organization's activities that encourage the use of data to support decision making. These actions involved the development of systems, tools and applications (all called "systems" in this report).

Photo credit: Canadian Armed Forces photo

Funding: There is no funding envelope associated with these activities. The funding and resources for activities have come from within individual L1s and from departmental sources.

Stakeholders: Strategic, tactical and operational decision making affects every part of DND/CAF. Therefore, the stakeholder group for this activity area is the entire organization.

A changing environment that introduces complexity and uncertainty: Virtually all activities in this area are affected by fundamental changes occurring in DND/CAF's IM and IT environments. This includes, for example, the modernization of major systems (e.g., Defence Resource Management Information System), the introduction of new systems (e.g., SAP HANA®), the introduction of analytics tools (e.g., Microsoft Power BI®), the development of enterprise-wide digital innovations (e.g., Value Cases), the creation of new organizational units (e.g., ADM [Data, Innovation, Analytics] [ADM(DIA)], Analytics Support Centres, etc.), major change initiatives (e.g., Defence Resource Business Modernization), advanced data initiatives (e.g., Artificial Intelligence), new technologies supporting operations and many others.

Major organizational change: During the evaluation, on December 6, 2022, the DM announced the creation of the Digital Transformation Office (DTO), which realigned responsibilities and accountabilities related to digitalization in DND/CAF. This is likely to affect all activities included in the scope of this evaluation.

Photo credit: Corporal Angela Gore, Canadian Armed Forces Photo

ACHIEVEMENTS TO DATE

🔍 FINDING 1: Progress has been slow in implementing systems that enable the Department of National Defence/the Canadian Armed Forces to use data to support decision making.

Important new foundational elements were established across DND/CAF.

Since 2017, important components have been put in place, including (not exhaustive):

- Creating and standing up ADM(DIA);
- Advancing five analytics Value Cases* with enterprise-wide priorities;
- Establishing and running coordinating committees at L1, L2 and L3 levels;
- Creating and standing up Analytics Support Centres across L1s;
- Developing and promulgating a suite of DND/CAF policies and guidance related to data and analytics, including many L1 versions;

- Providing and enabling training in related areas;
- Conducting analyses of capability gaps;
- Developing a process for defining data domains;
- Establishing a Tiger Team on data access; and
- Making "analytics" tools available to L1s (such as SAP Business Objects® and Microsoft Power BI®).
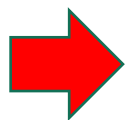
➡️ **It is important to recognize these accomplishments:**
- This was a completely new sphere of activity for DND/CAF.
- Many of these components required that new management, staff, organizational infrastructure, relationships, etc., be put in place.

Photo credit: Canadian Armed Forces photo

However, a patchwork of L1 systems has been or is being developed.

When asked about new systems that support decision making, L1s described a wide range of different areas of development:
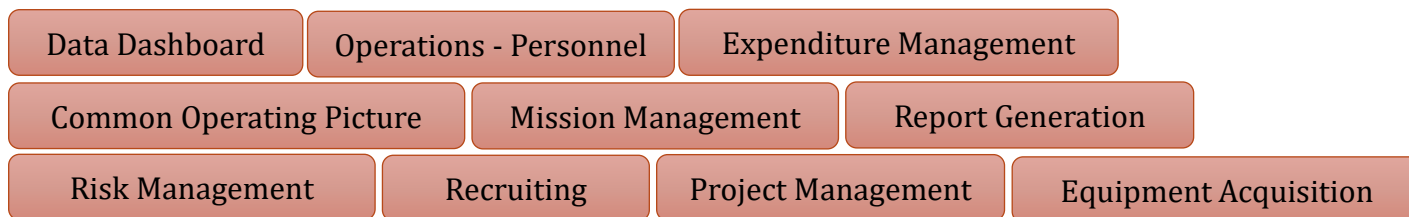
Data Dashboard	Operations - Personnel	Expenditure Management
Common Operating Picture	Mission Management	Report Generation
Risk Management	Recruiting	Project Management	Equipment Acquisition

State of Development – Systems in the Study	#
Functioning, with core items in place	9
Under development	5

Conclusion: Important foundational steps have been taken, and innovation has taken place. However, progress has been slow in putting in place practical systems that enable DND/CAF <u>as an enterprise</u> to use data to support decision making.

* **Value Cases** were defined at the outset of the Data Analytics Initiative as high-value propositions in priority areas such as the Departmental Results Framework, Business Planning and Supply Chain Management.

ENTERPRISE–LEVEL PRIORITY SETTING

🔍 FINDING 2: There is a need for Department of National Defence/Canadian Armed Forces-wide priorities for guiding development choices.

L1s developed systems to meet their individual needs with no DND/CAF priorities as reference.

➢ **Each L1 knew their business or operational requirement, knew the data and had access to the necessary skills.**
  • This enabled them to address an L1-specific need and, often, to do so quickly.
➢ **Systems to develop were most often chosen at the L3-level.**
  • There was little guidance on priorities from the L1 or L0 levels.
➢ **There were virtually no interactions between L1s.**
  • Progress in any one L1 was not replicated to others.
➢ **Five enterprise-level Value Cases were defined, and they progressed slowly or were put aside.**
  • There was little progress in areas identified as DND/CAF-wide projects.
➢ **Seventy-five Use Case* proposals were submitted by L1s, covering a wide diversity of topics and capabilities.**
  • The Use Cases contributed to innovation but were not aligned to a defined set of priorities.

Photo credit: Canadian Armed Forces photo

Conclusion: There were no DND/CAF-wide priorities to guide L1s in their development efforts, resulting in a patchwork of new systems.

Why this is important:
➢ Without defined priorities, there is no focus on investing in DND/CAF mandate needs.
➢ The opportunity to have L1s work on common needs leading to DND/CAF-wide innovation is lost.
➢ DND/CAF is not optimizing the use of its limited available personnel/funding/expertise.

➡️ **Caution:** It is also essential to allow and enable L1s to develop "low-hanging fruit" solutions that meet their own needs. This enables innovation leading to increased effectiveness and efficiency.

* Use Cases: a request was issued to L1s in 2019 for methodologies for how a user could use a system to accomplish a goal. ADM(DIA) enabled solutions for various Use Cases.

Priority Focus of the Systems Studied

Individual Systems' Focus	# Systems developed
Operational/Tactical	6
Support to Operational (corporate)	8

R1 Establish **DND/CAF-wide priorities for** developing decision support systems, ensuring a defined balance between strategic, operational and tactical priorities.

PRIORITY SETTING BY THE CANADIAN ARMED FORCES

🔍 FINDING 3: Canadian Armed Forces-specific priorities are required as guidance for enterprise priorities.

Operational L1s developed systems for addressing a wide diversity of needs, without a focus on what would enable the CAF most.

Operational L1s developed new systems in several areas:

L1-to-L0 dashboard	Equipment readiness	Personnel allocation
Common Operating Picture	Personnel availability	Workflow management
Volume trends	Recruiting	Mission management

Because there were no CAF-wide priorities set out:

➢ **No coordination or leverage across the CAF**
- L1s did not work together on areas of common interest that would benefit the CAF overall.
- L1s did not share what they developed, to see if others could also use it or further build onto it.

➢ **Non-operational L1s prioritized without clear guidance**
- Other L1s that support the CAF were not able to prioritize their activities in a way that best met the CAF's needs.
- There was a perception of "little connection" between systems that are operational and non-operational L1s.

➢ **Lack of guidance for enterprise-level priorities**
- Without clear CAF-specific priorities, it is not possible to develop sound priorities at the broader departmental/organizational level.

Conclusion: Without clear CAF-specific priorities, the broader department could not optimize the investments made in new systems such that they would respond to the CAF's needs.

Photo credit: SLt Delphine Bonnardot, Public Affairs, Op REASSURANCE RP001-2015-0040-041

R 2 **Establish CAF-specific priorities for developing decision support systems to inform L1 and DND/CAF enterprise priorities.**

SUCCESS FACTORS FOR INNOVATION

🔍 **FINDING 4:** Systems were developed where the need was defined, and the data/information was understood.

L1s were successful at developing decision support systems when there was a clear operational or business need, the data and information were understood, and technical expertise was available. When new analytics tools became available across DND/CAF, L1s began to build systems to organize and visualize data to support decisions, to automate processes and to use for other purposes. They understood and had access to the necessary data and information.

There were specific success factors leading to rapid action.

➤ **NEED:** Chosen systems addressed an identifiable need in support of decisions or actions.

➤ **DATA:** The L1s already understood the data well and had access to the core data.

➤ **SKILLS:** The L1s had access to the technical skills needed to build the systems.

➤ **TOOLS:** Analytics tools such as Power BI® and Business Objects® became available to L1s.
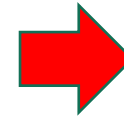
Annex D presents an example of a system developed by the Royal Canadian Navy (RCN) to respond to an identified need.

Data "problems" were identified and fixed.

➤ Every one of the 14 systems described in the evaluation found data problems during development.

➤ In each case, the exercise provided the opportunity to highlight the problems and address them.

Why this is important:

➤ Actual data problems did not prevent the development of a useful analytics solution. The system's development led to solving the data problems.

➤ There was no shortcoming in terms of "data literacy." Because there was a recognized need for the system, the importance of the data was also recognized.

Photo credit: Cpl Rob Stanley, 8 Wing Imaging

Conclusion: This finding suggests that any perceived weaknesses in data or lower data literacy in DND/CAF do not prevent the development of useful decision support systems.

DND/CAF should be cautious when investing in abstract data literacy activities or general exercises to improve data.

GOVERNANCE OVER DEPARTMENT OF NATIONAL DEFENCE/CANADIAN ARMED FORCES DIGITAL TRANSFORMATION

🔍 FINDING 5: Governance needs to be aligned and clarified.

The necessary enterprise-level governance is not fully defined. The recent creation of the DTO will produce a realignment of responsibilities and accountabilities. It is not yet clear which organization(s) will be responsible for communicating priorities, monitoring progress against those priorities and reporting on progress.

"Governance" is now incoherent and spread across several organizations.

➢ DTO responsibilities include digital transformation and change management, departmental project modernization, IM, and data and analytics enablement in certain areas.

➢ The CDS's CAF Digital Campaign Plan (DCP) includes objectives for aligning governing structures across the CAF.

➢ As indicated earlier, L1s are deciding to develop decision support systems based on their own operational needs and opportunities.

➢ The relevant L1-, L2- and L3-level "governance" committees are becoming less active and involved.

Photo credit: Master Corporal Matthieu Racette, Canadian Forces Combat Camera

Why this is important:

➢ Without clearly defined governance over this space, DND/CAF will not be able to monitor its progress against defined priorities or course-correct where necessary.

➢ Without aligned and clear governance, there is a risk that L1s' efforts will continue to be "siloed," thereby not optimizing DND/CAF investment in digital transformation.

Who decided which systems to develop in L1s:

"The trigger for developing this was unofficial:" **six systems**

"Asked by my supervisor to develop this:" **five systems**

"Request came from Command:" **three systems**

The DND/CAF Policy Framework does not reflect the TB Policy Suite:

➢ **The TB Policy on Service and Digital** includes broad principles, emphasizing an integrated approach to governance, planning and management.

➢ **DND/CAF's policy suite is not integrated and framed in a holistic manner to support the enterprise:** For example, "Integrated management of service, information, data, IT and cyber security within their department" (Policy s. 4.1.3.1.) is not in place in DND/CAF.
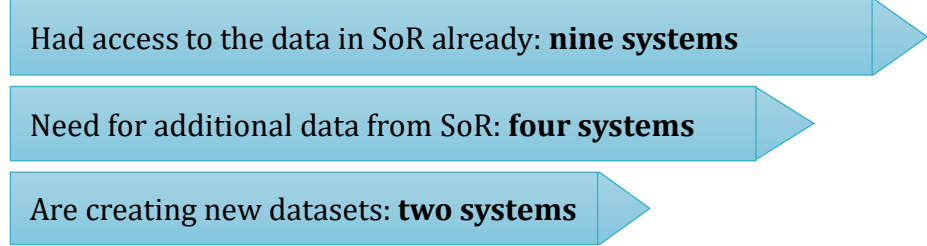
R 3 Establish a governance regime that will communicate DND/CAF priorities, monitor progress against those priorities and report on progress.

DATA AND INFORMATION MANAGEMENT

🔍 FINDING 6: Data and information are not yet managed as a strategic enterprise asset.

Most of the new systems were relying on data in SoR. However, data in other systems and newly digitized data were not formally managed.

What data is being used:

> Had access to the data in SoR already: **nine systems**

> Need for additional data from SoR: **four systems**

> Are creating new datasets: **two systems**

Access to data and updating data are important obstacles:

> "We shouldn't need to engage our Chain of Command to get access to data."
> "We had a data hurdle in getting the data through the portal of the MCS."
> "We need regular updating of data."
>
> L1 Interviewees

MSC signifies "Military Command Software Center."

Most new systems are not being formally documented.
- When asked if they were developing documentation to formally describe the elements of the new system, only one L1 indicated they had done so.
- All L1s recognized that the systems should be documented and formalized.

Conclusion: Data and information are not yet codified, managed, accessible or updated as frequently as needed in DND/CAF.

Photo credit: Corporal Eric Greico, Canadian Armed Forces Photo

> "People are still using email as a vehicle to transmit information. We need to find ways of capturing that information and make it available. We need to stop the culture of using email to exchange business information, discussions and decision making."
>
> L1 Interviewee

SYNTHESIS OF CONCLUSIONS

The evaluation was intended to determine DND/CAF's progress in leveraging data to support decision making at the strategic, operational and tactical levels. The evaluation research indicates that, at an enterprise level, DND/CAF has not made significant progress in terms of developing practical systems that use data to support decision making. Important progress has been made in implementing foundational elements for the organization, and capabilities and tools are available to L1s. However, a patchwork of L1-specific systems has been developed, which falls short of the objective of implementing an enterprise-wide culture and capability.

The evaluation determined that DND/CAF has not set out priorities that would guide the investments in systems development across the organization. Furthermore, the priorities for the CAF have not been established—priorities that would inform and help shape those DND/CAF investments.

Responsibilities and accountabilities for communicating these priorities, monitoring progress against the priorities and reporting on progress need to be clarified. The recent creation of the DTO provides an opportunity to define and implement those structures.

The evaluation findings indicated that weaknesses in data quality did not prevent the development of useful decision support systems. Furthermore, the findings suggested that perceived weaknesses in data literacy also did not prevent the development of systems. Data and information are not yet managed as an enterprise asset, even though there was a general recognition of the importance of achieving this objective. Additionally, the Department's policy framework does not reflect the integrative principles set out in the TB Policy on Service and Digital.

Overall, DND/CAF is not optimizing the investments in decision support systems currently being made across the organization. Setting out enterprise-wide priorities to guide these activities and implementing a structure to monitor and report on progress will help the organization's progress in leveraging data to support decision making at the strategic, operational and tactical levels.

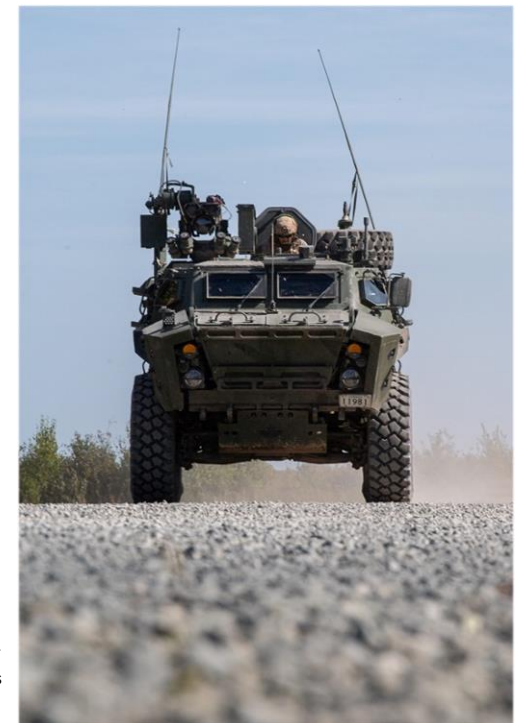Photo credit: Cpl Jay Ekin, Operation REASSURANCE Land Task Force Imagery Technician, RP006-2017-0001-007

Photo credit: Sergeant Vincent Carbonneau, Canadian Forces Combat Camera IS02-2019-0018-011

ANNEX A: KEY FINDINGS AND RECOMMENDATIONS

🔍 KEY FINDINGS	®️ RECOMMENDATIONS
FINDING 1: Progress has been slow in implementing systems that enable the Department of National Defence/the Canadian Armed Forces to use data to support decision making.	
FINDING 2: There is a need for Department of National Defence/Canadian Armed Forces-wide priorities for guiding development choices.	➤ Establish DND/CAF-wide priorities for developing decision support systems, ensuring a defined balance between strategic, operational and tactical priorities.
FINDING 3: Canadian Armed Forces-specific priorities are required as guidance for enterprise priorities.	➤ Establish CAF-specific priorities for developing decision support systems to inform L1 and DND/CAF enterprise priorities.
FINDING 4: Systems were developed where the need was defined, and the data/information was understood.	
FINDING 5: Governance needs to be aligned and clarified.	➤ Establish a governance regime that will communicate DND/CAF priorities, monitor progress against those priorities and report on progress.
FINDING 6. Data and information are not yet managed as a strategic enterprise asset.	

ANNEX B: MANAGEMENT ACTION PLAN

1) Establish DND/CAF-wide priorities for developing decision support systems, ensuring a defined balance between strategic, operational and tactical priorities.

3) Establish a governance regime that will communicate DND/CAF priorities, monitor progress against those priorities and report on progress.

Management Action

During FY 2022/23, key activities took place within DND/CAF to support data and digital transformation:
- Issued the 2019 CDS/DM Joint Directive on Data Management;
- Developed and promulgated a multi-stakeholder implementation plan for the DND/CAF Data Strategy approved by ADM(DIA);
- Published overarching Defence Administrative Orders and Directives on Data Management and Analytics, and on Data Access (Defence Administrative Orders and Directives 6500-0 and 6500-1);
- Published DND/CAF Data Governance Framework;
- Made meaningful progress in establishing a Data Stewardship Model within DND/CAF; and
- Set up and convened regularly a committee dedicated to data governance.

ADM(DTO), in collaboration with key DND/CAF stakeholders (ADM [Chief Information Officer] [ADM(CIO)], Vice Chief of the Defence Staff [VCDS]/Chief of Combat Systems Integration [CCSI], DND/CAF L1s), is clarifying authorities, responsibilities and accountabilities, which will result in changes to existing governance that will support the digital transformation of DND/CAF by providing strategic leadership and oversight on all matters related to the digital ecosystem (the merging of people, processes, technology and data). This governance will align with CCSI's role in brokering CAF requirements for pan-DND/CAF enablement on behalf of the VCDS role as the CAF Digital Champion.

Deliverables:
1. Finalize and publish ADM(DTO) authorities, responsibilities and accountabilities.
2. Finalize and publish Defence Digital Service Board Terms of Reference.
3. Establish joint governance between the DTO and CIO that will support the digital transformation and will align with the VCDS role in brokering CAF requirements for pan-DND/CAF enablement.
4. Develop prioritization criteria for new Digital Decision Support Systems.
5. Complete modernization of Application Portfolio Management Program.

Target dates:
1. October 2023; 2. January 2024; 3. April 2025; 4. January 2024; 5. April 2025

This Management Action Plan will be considered closed once all five interim action items have been completed.

OPI: DTO
OCIs: CIO, VCDS, Corporate Secretariat

ANNEX B: MANAGEMENT ACTION PLAN

| R   **ADM(RS) Recommendation**

2) Establish CAF-specific priorities for developing decision support systems to inform L1 and DND/CAF enterprise priorities. | **Management Action**

During the conduct of the ADM(RS) Evaluation in FY 2022/23, numerous key activities took place within the CAF to support data and digital transformation.

CCSI was established in June 2022 and the CAF DCP was subsequently published to communicate the CDS's plan to digitally transform the CAF by 2030. VCDS/CCSI is currently, in collaboration with key DND/CAF stakeholders (ADM[DTO], ADM[CIO], CAF L1s), developing a DCP Outcome-based Plan (DCP-OP) and the VCDS Implementation Directive, which will provide CAF L1s with key tasks that will enable CAF-specific prioritization of decision support systems. Following publication, the Directive and DCP-OP will designate CCSI as the lead for Operational Data Domains and establish a CAF digital governance mechanism, both of which will address this recommendation.

Deliverable: Formalize, promulgate and publish the DCP-OP and the VCDS Implementation Directive, after which the CAF Digital Hub, CAF Digital Governance and Chief Operational Data Office will be established.

Target date: December 2023

OPI: CCSI
OCIs: CIO, DTO and DND L1s |

ANNEX C: EVALUATION METHODOLOGY AND LIMITATIONS

Evaluation Methodology

The evaluation findings and recommendations were informed by multiple lines of evidence and qualitative research methods collected throughout the conduct phase to strengthen rigour and ensure the reliability of information and data-supporting findings. These lines of evidence were triangulated, and draft findings were shared with the Evaluation Advisory Committee. The research methodology used in the scoping and conduct of the evaluation are as follows:

Document Review

A preliminary review of the foundational documents was conducted during the planning phase, which supported developing a comprehensive understanding of the activities under evaluation and informed the development of the scope and the evaluation plan. Documentation included TB and departmental directives, policies, strategies, procedures, guidance and plans that related to the management and use of data in support of DND/CAF's mandate. In addition, Records of Discussion from four governance committees from 2018 to present were reviewed. Selected documentation was reviewed for systems described in the study.

Case Studies

In order to assess the state of DND/CAF's progress in developing tools, applications and systems to support decision making, the evaluation contacted nine L1s: the Canadian Army (CA), the RCN, the Royal Canadian Air Force, Canadian Joint Operations Command (CJOC), Canadian Special Operations Forces Command, VCDS, ADM (Materiel) (ADM [Mat]), ADM (Infrastructure and Environment) and ADM (Finance). These L1s were asked to identify the systems they had recently developed to help support strategic, operational or tactical decision making. Some L1s identified two systems, and some identified one system. The individuals who knew most about the development of the respective system were contacted, and they answered structured questions concerning the purpose of the system, the decision making underlying its development, status of data management, the development process, barriers to success, project status and other related matters.

In all, 14 systems were described as part of the evaluation. A summary was produced for each system, and the summary was provided to the interviewees for validation. An example is provided in Annex E.

Key Informant Interviews

The evaluation team identified key contacts in L1s across DND/CAF to identify newly developed systems to support strategic, operational or tactical decision making. Those interviewees were contacted to identify the owners of these systems. Detailed interviews were then held with owners of the systems using a structured interview guideline. In addition, interviews were held with key informants involved in the DND/CAF Data Analytics Initiative. Interviews were held with representatives from the TB Secretariat and three other federal organizations to discuss their challenges and experiences related to developing and improving systems to support decision making.

In all, the evaluation included 49 interviewees. Some interviews were one-on-one, and some were in small groups of two, three or four. Some individuals were interviewed multiple times to obtain additional information on the topics under discussion.

Validity of Methodology

The methodology is sufficient to ensure the validity and rigour of the findings and conclusions.

Photo credit: MCpl Manuela Berger, Formation Imaging Services – Halifax RP23-2019-0256-001

ANNEX C: EVALUATION METHODOLOGY AND LIMITATIONS

Evaluation Limitations

The limitations encountered by the evaluation and mitigation strategies employed in the evaluation process are set out in the following table:

Limitations	Mitigation Strategies
Self-selection of examples: L1s identified the systems to describe in the evaluation, which could result in actual or perceived bias in study findings.	**Self-selection of examples**: A preliminary interview was held with each L1 to help identify the systems that had been developed recently. This interview enabled the evaluators to ensure that the selection was suitable from a methodological perspective. Also, the objective of the evaluation was met more effectively by enabling L1s to identify the systems that they believed were most useful to support decision making.
The findings were not data-intensive: There was a reliance on interpretation of information. This could have led to risks concerning the perception of objectivity of the evaluation.	**The findings were not data-intensive:** This limitation was addressed using in-depth interviews to probe the rationale for decisions and actions. These interviews allowed the interviewer to verify the validity of statements. Furthermore, the evaluation included a sufficient number of examples so that selected information in one example could be validated by the information provided in other examples. Finally, summaries were developed to document each system described, and these summaries were provided to interviewees for validation. These actions all contributed to ensuring the validity of findings.
Systems/applications were still under development: The development of systems is a continuous process, and most were not finalized. As a result, there was a risk that the intended result of the systems would not be met eventually, and there was a perception that this might adversely affect the systems' usefulness as an example in the evaluation.	**Systems/applications were still under development:** The interview guideline was developed to focus on the decision making related to developing these systems, the experience of developing the systems, and barriers and success factors. As a result, the findings for each system would not be adversely affected in the event that the system development was encountering challenges or was not yet complete.

ANNEX D: SYSTEMS DESCRIBED AS PART OF THE EVALUATION

L1	System
CA	A Common Operating Picture of several dashboards, including personnel, equipment, training, finance and others
CA	Dashboard on equipment information to support decision making
CJOC	A Common Operating Picture to enable the rapid attainment of situational awareness
CJOC	Single source of information used by CJOC to allocate personnel
RCN	Overall view of where sailors are posted, their availability and reasons why they are unavailable
RCN	Portal for sailors to access information over their phones
Royal Canadian Air Force	Mission management tool to enable the Dispatch Section
VCDS	View of information on recruiting trends across the five regions
VCDS	Risk analysis tool to assist with DND/CAF investment planning
Canadian Special Operations Forces Command	Suite of web-based tools for operational support to manage operations
ADM(Mat)	Report on the status and trends of Capital Equipment Projects over $10 million
ADM(Mat)	Automation of the production of DND/CAF corporate reports
ADM (Infrastructure and Environment)	Project dashboard that includes several information components on L1 projects
ADM (Finance)	Analytic tool to help predict expenditures at year end

ANNEX E: Example

The RCN App

Purpose of the System

- The RCN App is a portal for RCN sailors to access information over their phones. The app will allow sailors to access information that would normally only be available on a computer with a Defence Wide Area Network connection and help them manage their daily activities. It provides a mechanism for sailors to stay informed and connected, and get their daily work done.

Impetus for the System

- The RCN App concept was requested by the Commander of the RCN as a means to digitalize some of the tools and services only available on the Defence Wide Area Network.

Development Evolution

- The RCN had never developed an app before. In 2018, the development team started at the drawing board from the very beginning. They needed to learn how to create the app: what was the process to follow, what were the security requirements, etc.

- In 2019 and 2020, workshops/basecamps were held with Regular and Reserve Forces across the country. Sailors provided their input on what the app should look like and what initial functionality should be included. The four first components were identified and chosen through that exercise. It took about a year and a half to complete the basecamps and define how the app should work.

- This involved considerable relationship management. The development team needed to learn how to "get contractors to do what needed to be done," and they often did not know how to proceed or how to ask for what they needed. The team had to learn how to work with ADM(IM) and ADM(Mat), and they had never dealt with them before. Those organizations were "upfront and supportive." The development team learned as the project moved forward.

New Data and Processes

- There were some new data capture processes developed: for example, the in/out routine. That process had been a PDF sent to sailors' civilian email. The developers worked to develop a digital in/out routine to be included in the app.

Success Factors

- One of the success factors was that the Commander of the RCN asked for this system to be developed. Additionally, the team had access to good people who "knew how to get things done," and they had the flexibility and freedom to focus and move the project forward. Command was briefed along the way every few months. Command's direction was "not to rush it and to get the core right."

Photo credit: S1 Taylor Congdon, Canadian Armed Forces photo